

**What is Claimed is:**

1. A bioadhesive composition formed by polymerising a homogeneous aqueous reaction mixture comprising from about 5% to about 50%, by weight of the reaction mixture, of at least one ionic water soluble monomer, from about 10% to about 50%, by weight of the reaction mixture, of at least one plasticiser (other than water), up to about 50%, by weight of the reaction mixture, of at least one non ionic water soluble monomer and up to about 40%, by weight of the reaction mixture, of water.
2. A bioadhesive composition exhibiting water stability as defined herein, said composition being formed by polymerising an aqueous reaction mixture comprising at least one ionic water soluble monomer, at least one plasticiser (other than water) and at least one non ionic water soluble monomer.
3. A bioadhesive composition as claimed in claim 2, characterised in that the aqueous reaction mixture comprises from about 5% to about 50%, by weight of the reaction mixture, of said ionic water soluble monomer.
4. A bioadhesive composition as claimed in claim 2, characterised in that the aqueous reaction mixture comprises from about 10% to about 50%, by weight of the reaction mixture, of said plasticiser (other than water).
5. A bioadhesive composition as claimed in claim 2, characterised in that the aqueous reaction mixture comprises from about 10% to about 50%, by weight of the reaction mixture, of said non ionic water soluble monomer.

6. A bioadhesive composition as claimed in claim 2, characterised in that the aqueous reaction mixture comprises from about 3% to about 40%, by weight of the reaction mixture, of water.

7. A bioadhesive composition as claimed in claim 1, characterised in that the composition provides adhesion on dry skin at no less than 0.5 N/cm.

8. A bioadhesive composition as claimed in claim 1, characterised in that said ionic monomer comprises an acrylate based monomer.

9. A bioadhesive composition as claimed in claim 1, characterised in that said ionic monomer comprises any of 2-acrylamido-2-methylpropane sulphonate acid, an analogue thereof or a salt thereof.

10. A bioadhesive composition as claimed in claim 1, characterised in that the reaction mixture comprises from about 30% to about 50%, by weight of the reaction mixture, of said ionic monomer.

11. A bioadhesive composition as claimed in claim 1, characterised in that said plasticiser comprises any of the following either alone or in combination: at least one polyhydric alcohol, at least one ester derived from polyhydric alcohol and at least one polymeric alcohol.

12. A bioadhesive composition as claimed in claim 1, characterised in that said plasticiser comprises at least one of glycerol and an ester derived from boric acid and glycerol.

13. A bioadhesive composition as claimed in claim 1, characterised in that the reaction mixture comprises from about 15% to about 45%, by weight of the reaction mixture, of said plasticiser (other than water).

14. A bioadhesive composition as claimed in claim 1, characterised in that said non ionic water soluble monomer comprises at least one of a mono- or dialkylacrylamide or an analogue thereof.

15. A bioadhesive composition as claimed in claim 1, characterised in that said non ionic water soluble monomer comprises at least one of N,N-dimethylacrylamide or an analogue thereof.

16. A bioadhesive composition as claimed in claim 1, characterised in that the reaction mixture comprises from about 15% to about 25%, by weight of the reaction mixture, of said non ionic water soluble monomer.

17. A bioadhesive composition as claimed in claim 1, characterised in that the composition further comprises at least one electrolyte.

18. The use of a bioadhesive composition as claimed in claim 1 in a biomedical skin electrode or in a wound dressing.

19. A bioadhesive composition formed by polymerising a homogeneous aqueous reaction mixture comprising from about 5% to about 50%, by weight of the reaction mixture, of at least one ionic water soluble monomer, from about 10% to about 50%, by weight of the reaction mixture, of at least one plasticiser (other than water), up to about 50%, by weight of the

reaction mixture, of at least one non ionic water soluble monomer, up to about 40%, by weight of the reaction mixture, of water, up to about 10%, by weight of the reaction mixture, of at least one surfactant and from about 1% to about 30%, by weight of the reaction mixture, of at least one hydrophobic monomer and/or polymer.

20. A bioadhesive composition formed by providing a homogeneously dispersed reaction mixture comprising both hydrophobic and hydrophilic components and polymerising said homogeneously dispersed reaction mixture such that on polymerisation the reaction mixture separates into a biphasic or multiphasic structure at least at a surface of the bioadhesive composition.

21. A bioadhesive composition as claimed in claim 20, wherein the bioadhesive composition comprises effective amounts of at least one ionic water soluble monomer, at least one plasticiser (other than water), at least one non ionic water soluble monomer, water, at least one surfactant, and at least one hydrophobic monomer and/or polymer.

22. A bioadhesive composition as claimed in claim 20, wherein the said reaction mixture comprises from about 5% to about 50% by weight of the reaction mixture of at least one ionic water soluble monomer, from about 10% to about 50%, by weight of the reaction mixture, of at least one plasticiser (other than water), up to about 50%, by weight of the reaction mixture, of at least one non ionic water soluble monomer, up to about 40%, by weight of the reaction mixture, of water, up to about 10%, by weight of the reaction mixture,

of at least one surfactant and from about 1% to about 30%, by weight of the reaction mixture of at least one hydrophobic monomer and/or polymer.

23. A bioadhesive composition as claimed in claim 19, characterised in that the composition provides adhesion of at least 0.35 N/cm on greasy skin of the type defined in tests herein.

24. A bioadhesive composition as claimed in claim 19, characterised in that the composition provides adhesion on dry skin at no less than 0.5 N/cm.

25. A bioadhesive composition as claimed in claim 19, characterised in that said ionic monomer comprises an acrylate based monomer.

26. A bioadhesive composition as claimed in claim 19, characterised in that said ionic monomer comprises any of 2-acrylamido-2-methylpropane sulphonic acid, an analogue thereof or a salt thereof.

27. A bioadhesive composition as claimed in claim 19, characterised in that the reaction mixture comprises from about 30% to about 50%, by weight of the reaction mixture, of said ionic monomer.

28. A bioadhesive composition as claimed in claim 19, characterised in that said plasticiser comprises any of the following either alone or in combination: at least one polyhydric alcohol, at least one ester derived from polyhydric alcohol and at least one polymeric alcohol.

29. A bioadhesive composition as claimed in claim 19,  
characterised in that said plasticiser comprises at least one of glycerol and an  
ester derived from boric acid and glycerol.

30. A bioadhesive composition as claimed in claim 19,  
characterised in that the bioadhesive composition comprises from about 15%  
to about 45%, by weight of the reaction mixture of said plasticiser (other than  
water).

31. A bioadhesive composition as claimed in claim 19,  
characterised in that the non ionic water soluble monomer comprises at least  
one of a mono- or dialkylacrylamide or an analogue thereof.

32. A bioadhesive composition as claimed in claim 19,  
characterised in that said non ionic water soluble monomer comprises at least  
one of N,N-dimethylacrylamide or an analogue thereof.

33. A bioadhesive composition as claimed in claim 19,  
characterised in that the reaction mixture comprises from about 15% to about  
25%, by weight of the reaction mixture, of said non ionic water soluble  
monomer.

34. A bioadhesive composition as claimed in claim 19,  
characterised in that the reaction mixture comprises from about 0.1% to about  
5%, by weight of the reaction mixture, of said surfactant.

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35. A bioadhesive composition as claimed in claim 19,  
characterised in that said surfactant comprises one or more non ionic  
surfactants.

36. A bioadhesive composition as claimed in claim 19,  
characterised in that the surfactant comprises one or more anionic surfactants.

37. A bioadhesive composition as claimed in claim 19,  
characterised in that the surfactant comprises one or more cationic surfactants.

38. A bioadhesive composition as claimed in claim 19,  
characterised in that the surfactant comprises at least one propylene  
oxide/ethylene oxide block copolymer.

39. A bioadhesive composition as claimed in claim 19,  
characterised in that the reaction mixture further comprises at least one lipid  
micellising polymer.

40. A bioadhesive composition as claimed in claim 39,  
characterised in that the reaction mixture comprises from about 0.1% to about  
5%, by weight of the reaction mixture, of lipid micellising polymer.

41. A bioadhesive composition as claimed in claim 39,  
characterised in that the lipid micellising polymer comprises any of the  
following either alone or in combination: poly (maleic acid-styrene), poly  
(maleic acid-butyl vinyl ether), poly (maleic acid-propyl vinyl ether), poly  
(maleic acid-ethyl vinyl ether) and poly (acrylic acid-ethyl acrylate).

42. A bioadhesive composition as claimed in claim 39,  
characterised in that the lipid micellising polymer comprises an alternating  
copolymer of styrene and maleic acid.

43. A bioadhesive composition as claimed in claim 39,  
characterised in that the reaction mixture comprises from about 1% to about  
15%, by weight of the reaction mixture, of said hydrophobic monomer.

44. A bioadhesive composition as claimed in claim 39,  
characterised in that said hydrophobic monomer comprises any of the  
following either alone or in combination: n-butyl acrylate, n-butyl  
methacrylate, a hexyl acrylate, iso-octyl acrylate, isodecyl acrylate, ethoxyethyl  
acrylate teahydrofurfuryl acrylate, vinyl propionate, and vinyl butyrate.

45. A bioadhesive composition as claimed in claim 39,  
characterised in that the hydrophobic monomer comprises at least one of  
ethoxy ethyl acrylate or butyl acrylate.

46. A bioadhesive composition as claimed in claim 39,  
characterised in that the reaction mixture from about 3% to about 20%, by  
weight of the reaction mixture, of said hydrophobic polymer.

47. A bioadhesive composition as claimed in claim 39,  
characterised in that the said hydrophobic polymer comprises any of the  
following either alone or in combination: vinylacetate dioctyl maleate  
copolymer or ethylene vinylacetate copolymer.

48. A bioadhesive composition as claimed in claim 1, wherein the polymerisation is a free radical polymerisation.

49. A bioadhesive composition as claimed in claim 48, wherein the free radical polymerisation is performed in the presence of a photoinitiator.

50. A bioadhesive composition as claimed in claim 49, wherein the photoinitiator comprises 1-hydroxycyclohexyl phenyl ketone, 2-hydroxy-2-propyl phenyl ketone or a mixture thereof.

51. The use of a bioadhesive composition as claimed in claim 19 in a biomedical skin electrode or in a wound dressing.

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